

REMARKS

Claim 1 has been amended at line 9 to delete the phrase "which temperature is close to or above the boiling point of a)". Claim 1 has also been amended at line 10 to delete the word "applied". These amendments are made in an effort to place Claim 1 in better form.

Claim 2 has been amended at line 10 to delete the phrase "provided that R¹ may also represent" and to substitute therefor the word "or". This amendment is made in an effort to place Claim 2 in better form.

Claim 3 has been amended at line 1 to replace the word "The" with "An". Claim 3 has further been amended to add "the group consisting of" after "selected from". Claim 3 has also been amended to delete an extraneous parenthesis and substitute therefor a hyphen. These amendments are made in an effort to place Claim 3 in better form.

Claim 3 has further been amended to recite that the ether (poly)isocyanate has a hydrolyzable chlorine content of less than 0.1%. Support for this amendment is found in Example 1 and in the Comparative Example.

Claim 4 has been amended to change its dependency from Claim 1 to Claim 3. Claim 4 has further been amended to delete the prefix "poly" which appeared before "(poly)isocyanate" and "polyurethane" and thereby place the claim in better form.

The present invention relates to a process for the production of ether (poly)isocyanates in which an ether (poly)amine is reacted with at least a stoichiometric amount of phosgene in the vapor phase at a temperature of from about 50 to about 800°C under pressure. The present invention also relates to specific ether isocyanates produced by this process and to a process for the production of urethanes from such ether isocyanates.

Claims 1-4 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Eight specific bases for this rejection were given. Applicants believe that the amendments made herein remove each of these bases for this rejection.

The first basis for this rejection was that use of the word "close" at line 9 of Claim 1 rendered the claim indefinite.

Claim 1 has been amended to delete the phrase in which the word "close" appeared. It is believed that this amendment removes this basis for the rejection.

The second basis for this rejection was that use of the word "may" at line 10 of Claim 2 rendered the claim indefinite.

Claim 2 has been amended to delete the phrase in which the word "may" appeared. It is believed that this amendment removes this basis for the rejection.

The third basis for this rejection was that "The" of Claim 3 lacked antecedent basis.

Claim 3 has been amended to replace the word "The" with "An". It is believed that this amendment removes this basis for the rejection.

The fourth basis for this rejection was that in Claim 3, the second parenthesis of the first compound was improper.

Claim 3 has been amended to remove this parenthesis and to substitute therefor a hyphen. It is believed that this amendment removes this basis for the rejection.

The fifth basis for this rejection was that the Markush group of Claim 3 was improper because the species were not referred to in the alternative.

Claim 3 has been amended to the accepted Markush group language of "selected from the group consisting of". It is believed that this amendment removes this basis for rejection.

The sixth basis for this rejection was that it was unclear why "poly" was in parentheses in Claim 3.

Claim 3 has been amended to delete the parenthetical expression "(poly)". It is believed that this amendment removes this basis for the rejection.

The seventh basis for this rejection was that it was unclear how much pressure constitutes applied pressure in Claim 1.

Claim 1 has been amended to delete the word "applied". It is believed that this amendment removes this basis for the rejection.

The eighth basis for this rejection was that Claim 4 specifies production of a "polyurethane" but monofunctional isocyanates will not produce a polyurethane.

Claim 4 has been amended to delete the prefix "poly" from polyurethane. This amendment therefore removes this basis for the rejection.

Withdrawal of this rejection is therefore requested.

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Van Eyck et al (U.S. Patent 4,062,833). Applicants respectfully traverse this rejection.

Van Eyck et al discloses biuret polyisocyanates which are produced by reacting bis(2-isocyanatoethyl)ether with water. It is indicated in the Office Action that the bis(2-isocyanatoethyl)ether is considered to be a homolog of Applicants' isocyanates claimed in Claim 3 because the claimed isocyanates differ from the disclosed isocyanates only with respect to two pendent methyl groups.

Applicants submit, however, that the single isocyanate disclosed by Van Eyck et al is not a homolog of the claimed isocyanates. Further, the mere naming of a structurally similar compound in the prior art does not establish a proper *prima facie* case of obviousness.

Some motivation for one skilled in the art to modify prior art compounds in the manner necessary to "arrive at" the compounds being claimed must be established before a rejection under 35 U.S.C. § 103 is proper. Such motivation has not, however, been established in the present case.

More specifically, Van Eyck et al teaches only one isocyanate which is useful in the disclosed process for producing the desired biuret. That isocyanate is bis(2-isocyanatoethyl)ether. Van Eyck et al **does not** teach or suggest any other isocyanate, much less the specific isocyanates being claimed by Applicants. Nor does Van Eyck et al teach or suggest modification of that single known, disclosed isocyanate in the manner necessary to "arrive at" Applicants' claimed isocyanates.

Further, Van Eyck et al discloses only one method for making the isocyanate required therein. However, this disclosed method does not produce isocyanates having the low hydrolyzable chlorine contents required for Applicants' claimed

isocyanates as is evident upon comparison of the properties of Example 1 and the Comparative Example in Applicants' specification.

Compounds which are not disclosed in the cited prior art and which can not be made by the only process disclosed in the cited prior art can not properly be considered obvious in view of that cited prior art.

Applicants' isocyanates claimed in Claim 3 are not therefore rendered obvious by the teachings of Van Eyck et al.

In re Lohr et al, 137 USPQ 548 (CCPA 1963) was cited in the Office Action to support this rejection. Applicants submit, however, that the present case is clearly distinguishable from that decided by the CCPA in In re Lohr et al on its facts and does not support a rejection of Applicants' claims under 35 U.S.C. § 103.

More specifically, in In re Lohr et al, *supra*, the cited prior art taught structurally similar compounds which could be produced by similar methods and which had similar properties and the same use as the compounds claimed by the applicant.

In contrast, in the present case, Applicants have shown that the only disclosed method for producing the only reference isocyanate produces a product having a higher hydrolyzable chlorine content than the isocyanate produced in accordance with the present invention. (See Example 1 and the Comparative Example) That is, Applicants' claimed isocyanates having a hydrolyzable chlorine content of less than 0.1% are not produced by a method similar to that disclosed by Van Eyck et al. Two of the bases for the CCPA's decision in In re Lohr, *supra*, (i.e., production by a similar method and similar properties) are **not** therefore **present** in this case.

In re Lohr, *supra*, does not therefore support the rejection of Applicants' Claim 3.

Withdrawal of this rejection is therefore requested.

Claim 4 was rejected under 35 U.S.C. § 102(b) as being anticipated by Lehmann et al (U.S. Patent 3,267,122). Applicants submit that Claim 4 as amended herein is patentably distinct from the polyurethanes disclosed by Lehmann et al '122.

Lehmann et al discloses isocyanato alkoxy alkanes corresponding to a specified formula. Lehmann et al is cited for its teaching that the disclosed isocyanates are intermediates for the production of polyurethane elastomers and foams.

Lehmann et al does **not** teach or suggest the specific isocyanates which must be used in Applicants' process as presently claimed in Claim 4. Lehmann et al does not therefore disclose Applicants' claimed process with the specificity necessary to support a proper rejection under 35 U.S.C. § 102(b).

Withdrawal of this rejection is therefore requested.

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lehmann et al (U.S. Patent 3,267,122) in view of Joulak et al (U.S. Patent 5,391,683) or Biskup et al (U.S. Patent 5,449,818) or Bischof et al (U.S. Patent 5,516,935). Applicants respectfully traverse this rejection.

Lehmann et al discloses a process for the production of ether isocyanates in which amines corresponding to a specified formula are phosgenated by the known cold phase-hot phase phosgenation or by the known hydrochloride process. A key feature of the Lehmann et al process is the use of the specific amines required therein.

Lehmann et al clearly states that one of the problems encountered with phosgenation of ether diamines is the substantially complete production of ether cleavage products. (at col. 1, lines 16-18) Lehmann et al "resolved" this problem by selecting specific diamines to be phosgenated. In fact, Lehmann et al states:

Only when using certain amines (as above defined in the formula) will the corresponding isocyanate be formed in desirable yields. at column 1, lines 55-57. (emphasis added)

Applicants' claimed process **is not limited** to the amines required by Lehmann et al. Applicants have found that selection of specific diamines is not necessary when vapor phase phosgenation of any ether amine in accordance with their claimed process is carried out.

Joulak et al discloses a process for the preparation of aromatic polyisocyanates by reacting an aromatic diamine or polyamine with phosgene in the gaseous phase.

Joulak et al does not teach or suggest that an ether diamine or polyamine could be phosgenated by the disclosed process.

As was discussed in the background of the Lehmann et al reference, the problems encountered in phosgenating ether amines are unique and are not encountered with phosgenation of other types of amines. Consequently, a reference such as Joulak et al which does not include any teachings with respect to ether amines would not be considered pertinent prior art by one skilled in the art seeking to produce ether polyisocyanates.

One skilled in the art addressing the same problem as that which was addressed by Applicants would not therefore combine the teachings of Lehmann et al with those of Joulak et al in the manner suggested in the Office Action. The suggested combination of Lehmann et al and Joulak et al does not therefore establish a proper *prima facie* case of obviousness.

However, even if the skilled artisan were to attempt to combine the teachings of Lehmann et al and Joulak et al, the resultant process would be limited to phosgenation of the specific amines required by Lehmann et al. Applicants' process is not limited to those amines.

Applicants' ability to use an ether (poly)amine in their claimed process is not consistent with Lehmann et al's teaching that only specific ether amines can be successfully phosgenated. An invention which achieves a result that the prior art teaches could not be achieved can not be considered obvious in view of that prior art. Applicants' claimed process can not therefore be considered obvious in view of the teachings of Lehmann et al in view of Joulak et al.

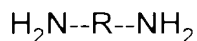
Applicants would further note that the yields of ether isocyanates reported by Lehmann et al ranged from 65 to 81% of theoretical. Applicants' process produced the desired ether (poly) isocyanates in yields ranging from 96.8 to 99.5% of theoretical in the Examples given in the specification. These higher yields achieved

by Applicants' process could not possibly have been predicted from the teachings of Lehmann et al and Joulak et al.

Applicants' invention as claimed in Claims 1 and 2 is therefore patentably distinct from any process which could be "derived" from the teachings of Lehmann et al and Joulak et al.

Withdrawal of this rejection is therefore requested.

Biskup et al discloses a process for the preparation of aromatic diisocyanates in which the corresponding diamine is phosgenated in the gaseous phase. The aromatic diamines useful in this disclosed process are represented by the formula



in which the R group represents a hydrocarbon residue containing at least one aromatic system and may have additional residues such as alkyl groups, halogen atoms or ether groups.

Biskup et al does not teach where in the hydrocarbon residue any residual ether group might be present. Nor does Biskup et al address the issue of ether cleavage products.

One skilled in the art seeking to develop a process for producing ether (poly)isocyanates in high yields would hardly consider the Biskup et al disclosure which does not address the unique problems encountered in such phosgenation processes pertinent prior art. That skilled artisan would not therefore combine the teachings of Lehmann et al and Biskup et al in the manner suggested in the Office Action.

The suggested combination of Lehmann et al and Biskup et al does not therefore establish a proper *prima facie* case of obviousness.

However, even if one skilled in the art were to attempt to combine the teachings of Lehmann et al and Biskup et al, he would "arrive at" a process in which the specific ether diamines of Lehmann et al must be used.

As has already been discussed, however, Applicants' process is not limited to the Lehmann et al ether diamines. Nonetheless, Applicants' process which is contrary to the teachings of Lehmann et al produces ether (poly)isocyanates in

yields which are substantially higher than those which could have been expected from the teachings of Lehmann et al.

The combined teachings of Lehmann et al and Biskup et al can not therefore be properly construed in a manner which would render Applicants' claimed invention obvious.

Withdrawal of this rejection is therefore requested.

Bischof et al discloses a process for the production of aliphatic and cycloaliphatic diisocyanates in which the corresponding diamine is phosgenated in the gaseous phase.

Bischof et al does not teach or suggest that the disclosed process could be successfully used to phosgenate ether (poly)amines.

In view of the unique problems encountered in phosgenating ether (poly)amines as discussed by Lehmann et al, one skilled in the art seeking to develop a process for the production of ether (poly)amines in high yield would not consider the Bischof et al disclosure that does not address these problems to be pertinent prior art. That skilled artisan would not therefore combine the teachings of Lehmann et al and Bischof et al in the manner suggested in the Office Action.

The suggested combination of the teachings of Lehmann et al and Bischof et al does not therefore establish a proper *prima facie* case of obviousness.

Further, even if one skilled in the art were to attempt to combine the teachings of Lehmann et al with those of Bischof et al, the resultant process would be limited to the specific diamines required by Lehmann et al. There is no teaching in either reference which would lead one skilled in the art to recognize that limitation to such specific diamine would be unnecessary if the phosgenation process were conducted in the gas phase under the temperature and pressure conditions of Applicants' process.

The teachings of Lehmann et al and Bischof et al can not therefore be combined in any manner which would render Applicants' claimed process obvious.

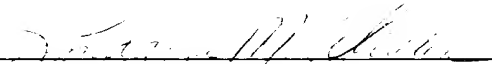
Withdrawal of this rejection is therefore requested.

In view of the above amendments and remarks, reconsideration and allowance of Claims 1-4 as amended herein are respectfully requested.

Respectfully submitted,

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